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19. ABSTRACT (Continue on reverse if necessary and identify by block number)				
<p>This report covers the POP tests performed on wood wirebound box fabricated per MIL-B-46506. This wirebound box is being used as shipping and storage container of various 60MM Mortar Cartridges.</p> <p>The wirebound box tested (P/N 9234845) contained two metal containers PA60 (P/N 9234844). Each metal container contained eight cartridges each packaged in spirally wound fiber container (P/N 9254735).</p> <p>The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations, "Transportation of Dangerous Goods" and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178.</p>				
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I. Report Number: DOD POP HMTR/AYD 94-014

II. Title: Performance Oriented Packaging (POP) Testing of 60mm HE
M49A4 Mortar Cartridge, Packed sixteen (16) in a Wood
Wirebound Box

Drawing Number: 9234845

Author: Oltea L. Bogdan

Performing Activity: U.S. Army Armament Research, Development
and Engineering Center (ARDEC)

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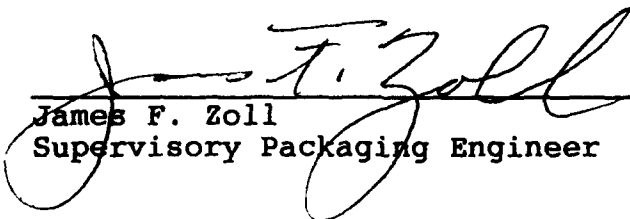
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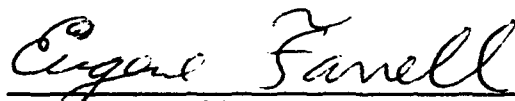
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APPROVED BY:



Gene Farrell
Acting Chief, Packaging Division

I. Data:

Container:

Type: Box, Wirebound
 Code: 4C1
 Specification: MIL-B-46506
 Drawing Number: 9234845
 Material: Wood
 Capacity: 33.86 liters
 Dimensions:
 Inside: 31.91 cm X 30.80 cm X 34.45 cm
 (12 9/16 in X 12 1/8 in X 13 9/16 in)
 Outside: 37.94 cm X 33.50 cm X 37.07 cm
 (14 15/16 in X 13 3/16 in X 14 19/32 in)
 Closure Method/Type: 1 Flat strapping or
 2 Galvanized Round Steel Tying Wire
 Gross Weight: 46 kg (101.2 pounds)
 Tare Weight: 6.4 kg (14.01 pounds)

Additional description: Each cartridge is packed in PA59 Fiber Container in accordance with drawing 9254735. Eight fiber containers are packed in the PA60 Metal Container in accordance with drawing 9234844. Two metal containers are overpacked in the wirebound box in accordance with drawing 9234845.

Product:

1. Name: Cartridge 60MM, HE, M49A4 W/Fuze PD M525
 Drawing Number: 9220179
 Cage Code: 19203
 National Stock Number: 1310-00-134-8359
 DOD Identification Code: B632
2. Name: Cartridge 60MM, HE, M49A4 W/Fuze PD M717
 Drawing Number: 9220179
 Cage Code: 19203
 National Stock Number: 1310-00-926-9428
 DOD Identification Code: B632
3. Name: Cartridge 60MM, HE, M49A4 W/Fuze PD M935
 Drawing Number: 9220179
 Cage Code: 19203
 National Stock Number: 1310-01-240-9255
 DOD Identification Code: B632

Proper Shipping Name:	CARTRIDGES FOR WEAPONS
United Nation Identification Number:	0321
United Nation Packaging Group:	II
Physical State:	Solid

II. Reference Material:

- a. Federal Register, "49 CFR Part 107-179"
- b. United Nations, "Transport of Dangerous Goods"

III. Background:

This Performance-Oriented Packaging (POP) test was performed to ascertain whether the MIL-B-46506 wood wirebound box used for shipping and storage of various 60MM Cartridges meet the Packaging Group II requirements specified by the Code of Federal Regulations Title 49, Part 107 through 179 dated 1 October 1993.

The box tested conforms to MIL-B-46506, Type II, Class 1, Grade A and contains sixteen cartridges each; one cartridge is packed in a fiber container and eight packaged fiber containers are packed in a metal container.

Two steel straps are used to secure the wood wirebound box during the tests.

IV. Tests Performed

The following POP tests were performed at ambient temperature:

1. Vibration Test

Procedure:

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. Three wirebound boxes loaded and closed as for shipment were placed on a vibrating platform. The vertical double-amplitude of vibrating platform was one inch at a frequency of 240 cycle per minute for one hour. The frequency was sufficient to allow the package to become completely airborne and enable a 1/16" piece of strapping material to be slid underneath the package during vibration.

Discussion:

Immediately following the vibration test, each container was removed from platform, turned on its side and observed for any

evidence of leakage. All containers remained securely closed and there was no evidence of leakage of contents.

Results:

After the tests, the wirebound boxes experienced no structural damage; there was no spillage of contents; the passing criteria was met.

2. Stacking Test

Procedure:

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. Three different wirebound boxes were used, each loaded with a stack weight of 946 pounds. This simulates the weight imposed on the bottom container of a ten-foot stack of identical containers. The test was performed for 24 hours.

Discussion:

After the allowed time, the weight was removed and the container was observed for any evidence of leakage, deterioration or distortion.

Results:

During test, the container supported the total load adequately. No structural damages were found on the tested container. The passing criteria was met.

3. Drop Test

Procedure:

The test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. One container was used for each drop orientation. The drop height was 1.2 meters (four feet) with the following sequence:

- a. Flat on Bottom
- b. Flat on Top
- c. Flat on Long Side
- d. Flat on Short Side
- e. One Corner

Discussion:


The contents of the container were retained within its

package and exhibited no damage liable to affect safety during the transportation.

Results:

There was no visible damage on the first four drops. On the fifth drop (on one corner), the impact corner received minor indentation. Also, minor cracks were observed on the top panel of the wirebound box. However, the container was in a sound condition. All contents remained inside the container and package was capable of being handled without danger of spillage. The container exceeded the passing criteria of CFR 49.

V. Based on the above POP testing, the following POP symbol has been applied to wirebound box in accordance with drawing 9234845.

 4C1/Y46/S/[--]

Insert the last two digits
of year packed.